High Speed Ground Transportation Study

Executive Summary

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EXECUTIVE SUMMARY

Washington High Speed Ground Transportation Study
Steering Committee
October 1992

Appointed Members

John Magnano	Chair Clark County Commissioner
Judy Runstad	Vice-Chair Foster, Pepper & Shefelman
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Bill Brubaker	Snohomish County Council
Dean 0. Claussen	Citizen
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DJ Mitchell	Burlington Northern Railroad
Mike Layton	Citizen
Paige Miller	Port of Seattle Commission
Peter M. Montague	Federal Railroad Administration (represented by Chuck Chappell - Federal Highway Administration)
Gerrit "Buzz" Moore	Washington Environmental Council
Everett P. "Pete" Paup	Manson Construction and Engineering
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Gary Chandler	State Representative
Ruth Fisher	State Representative
Pat Patterson	State Senator
Larry Vognild	State Senator
Barbara Shinpoch	State Transportation Commission

Non-Voting Liaison Members

Vince Collins	Deputy Minister of Transportation and Highways Province of British Columbia (represented by Nicholas Vincent - Senior Policy Advisor - Rail)
Donald E. Forbes	Director of the Oregon Department of Transportation State of Oregon

I. ABOUT THIS STUDY

- **In 1991, the Washington State Legislature enacted Chapter 231, Laws of 1991 (SHB 1452), which directed that a comprehensive assessment be made of the feasibility of developing a high speed ground transportation (HSGT) system in the State of Washington.**

- **The legislation came about because there was a growing recognition that major transportation corridors were reaching unacceptable levels of congestion, and that even though most large metropolitan areas were developing specific plans to ease that congestion within their urban boundaries, intercity travel between those areas was becoming increasingly difficult.**

- **High speed trains have been in service for years in Japan and Europe and other high speed technologies, such as magnetically levitated trains (maglev), are being developed and nearing implementation. In addition, these systems appear well used.**

- **The legislation created a Steering Committee (identified on the previous page) to oversee the study work and content, and also created an Office of High Speed Ground Transportation within the State Department of Transportation to provide staff support to the Steering Committee. During the conduct of this study, ten members of the steering committee, and the DOT and consultant project managers visited systems in four European countries to evaluate first hand the potential for such systems in the State of Washington. This trip was made voluntarily and each member was responsible for his or her own costs.**

- **The Study Area included the State of Washington plus the Portland, OR urban area and the Lower Mainland of British Columbia. Two major corridors were identified and analyzed.**

    1. North-South (Portland, OR to Seattle to Vancouver, BC)

    2. **East - West** (Sea-Tat to Moses Lake to Spokane)

- **Study issues included**

  - Economic feasibility
  - Demand forecasts and ridership
  - Corridor identification
  - Land use and economic development impacts
  - Environmental review
  - Regional transportation plan compatibility
  - Modal interface
  - Technological options
  - Technical requirements
  - Possible use of existing highway or railroad rights-of-way
  - Additional right-of-way needs
  - Institutional and legislative needs
  - Financing options for capital
  - Financing options for operations and maintenance
  - Funding sources and financial analysis

- **The study was not meant to focus on the technologies but rather on the economic, environmental, institutional and financial feasibility of implementing HSGT in this state.**

- **The study was not meant to be a "siting" study. Alignments and station locations were assumed only to test feasibility, and to evaluate corridors and service areas. Specific location decisions will require more detailed engineering and operations studies.**

II. THE NEED FOR ACTION

- **In authorizing this study, the Washington State legislature recognized that ... "Major transportation corridors in the state 'are reaching unacceptable levels of congestion."**

- **The Study Area is growing at more than double the U.S. national average, by the year 2020**

  Population will increase from 7.7 million to almost 10.8 million
  Employment will increase from 4.0 million to almost 6.0 million .
  Average household income will increase by over 35 %
  Intercity travel will increase by over 75 %

- **Current urban area transportation planning efforts address a portion of the issue, but intercity travel requires different solutions.**

- **Meeting the increased demand by reliance on the highway and air modes raises significant concerns**

  Intercity highway trips must rely on the same major highways in urban areas that are already congested by shorter urban trips. For example, if the entire demand was met by the highway system in the Central Puget Sound region, the State Transportation Systems Planning effort forecasts a need for an additional 700-lane miles of freeways in the Central Puget Sound Region alone by 2012.

    Even with major highway expansion, the Puget Sound region would still be faced with peak period congestion which would also impact intercity trips.

    An alternative which encompasses both urban rail and intercity HSGT merits serious consideration.

The Puget Sound Air Transportation Committee forecasts the need for increased capacity and improved all-weather reliability at Sea-Tat Airport prior to the year 2000 - long before any significant HSGT system could be in place.

Even with this increased capacity, by 2020 the Sea-Tac airport, by itself, could only meet approximately 90% of projected demand and without further relief would experience a significant increase in delays.

- **Developing HSGT as a third mode of intercity passenger transport significantly increases the options for accommodating intercity travel. However, implementing HSGT requires a long lead time; and that process needs to begin now.**

- **Other studies have shown that the U.S. has the highest per capita automobile vehicle miles of travel (vmt) and the lowest bus and rail vmt of any industrialized country. Implementing a major new mode such as HSGT will require time.**

Time to build an awareness of and a propensity to use rail such as exists in Europe and Japan

Time to demonstrate the potential of true high-quality rail service

Time to implement the legislative and funding initiatives necessary

- **In summary, if we are to meet the travel needs of our state and region in a manner which supports economic growth and maintains our quality of life and environment, the development of a truly competitive third mode of intercity travel is a must.**

III. FINDINGS

A COMMITMENT TO HIGH SPEED GROUND TRANSPORTATION SERVICE IS WARRANTED

- **Existing air and highway modes are facing severe congestion**

  Total intercity travel will increase by more than 75% by the year 2020. It's unlikely that the highway and air systems could be expanded to meet this demand.

- **A third intercity passenger mode can be a major factor in maintaining the quality of life and economic vitality of Washington**

  HSGT is compatible with Regional Transportation Plans as they exist today, and with proper planning, can result in a comprehensive intermodal network.

  HSGT can be integrated and coordinated with urban high capacity transit, commuter rail and local bus services.

  HSGT has the potential to support growth management objectives in the counties it serves.

  To offer an effective supplement to air commuter service and to maximize flexibility among intercity modes, HSGT should serve the major airports and the major urban areas.

  The N-S Corridor between Everett and Portland offers the best near term opportunity for implementing a high quality intercity rail service. Completion of this corridor north to Vancouver, B.C. would assist the northwest economy in reaching its full international potential.

  The E-W Corridor between Spokane and Seattle offers the best long term opportunity to utilize the speed advantage of true high speed service and provides attractive long term opportunities for supporting increased economic activity and diversity east of the Cascades.

- **Significant ridership potential exists for HSGT**

Population in the study area is projected to increase by over 39% by 2020; employment is projected to increase by over 49%. These are more than double the U.S. national average.

There is significant HSGT ridership potential even under the assumption that existing levels of highway and air congestion remain the same through the year 2020.

Assuming 1992 congestion levels on the highway and air systems, a 185 mph HSGT system would attract the following annual ridership in the year 2020

Corridor		Ridership
North-South	:	5,121,000
East-West	:	2,264,000
Total	:	7,385,000

Sensitivity testing of the demand model based on recent survey data indicates that a decrease in the average speed on I-5 through the Seattle and Portland urban areas to 35 mph would result in an increase of 8% in HSGT ridership.

Sensitivity testing of the demand model also indicates that an increase in the average cost of gasoline to **$1.80/gallon** would result in an increase of 23 % in HSGT ridership.

Depending on the alternative selected, **farebox** revenues will cover annual operating and maintenance (O&M) costs within 12 to 15 years after start of operations and generate a surplus from that point forward. By comparison, most urban public transit systems operate at less than 50% fare box recovery.

- HSGT provides a safer, environmentally superior and cost effective method for providing increased travel capacity.

  Environmentally, there are no “fatal flaws” to HSGT implementation.

  HSGT need not depend on petroleum based fuels.

  Compared to competing modes, HSGT is cost effective. It offers significant opportunities to reduce the cost of accidents and environmental degradation while accommodating the projected growth.

    A double-track HSGT system could carry 12,000 people/hour/direction on a right-of-way width of 100 feet; a highway of similar capacity would require up to 250 feet of right-of-way.

    HSGT can absorb a 2000% growth in ridership beyond current 2020 projections without additional right-of-way or trackage.

  HSGT provides a reliable, all-weather service.

- **Proven HSGT technologies are available now**

  Both rail and maglev HSGT technologies are available. However, the marginal ridership gains of a maglev option (13.6%) do not justify the 37% increase in cost and increased technological risk at this time,

HSGT IMPLEMENTATION REPRESENTS A MAJOR PUBLIC WORKS UNDERTAKING

- **HSGT costs are comparable to our investment in interstate highways.**

At current (1992) price levels, the capital costs for a 185 mph **HSGT are** significant.

RANGE OF ESTIMATED COSTS

Corridor	"Low"		"High"
North-South (334 miles)	$ 9.03	-	$11.95 Billion
East-West (256 miles)	$5.45	-	$ 7.31 Billion
Total (590 miles)	$14.48	-	$19.26 Billion

In evaluating such numbers, it should be noted that our Interstate Highway network has been under development for 38 years. To duplicate I-5 and I-90 (roughly the same corridors as the N-S and E-W HSGT respectively) today is estimated to cost $20.1 billion.

At an annual expenditure rate of $500 million (roughly equivalent to the current annual Washington DOT Highway program), the full 590-mile (185 mph) HSGT system would require 29 to 39 years to complete.

Various funding options must be studied. As an example, a $500 million/year capital program is equivalent to a dedicated increase of **$0.20/gallon** in the State gasoline tax or 0.5% in statewide sales tax. (It should be noted that a constitutional amendment would be required in the State of Washington to allow gas tax monies to be used for **HSGT).**

HSGT IMPLEMENTATION REQUIRES BOTH NEAR TERM & LONG RANGE ACTION

- **HSGT implementation requires that certain public policy issues must be addressed now if we are to move forward.**

  True HSGT (150+ mph) service is affordable only through a major State funding commitment that is not currently in place.

  A single Public Entity should be designated to have responsibility for implementing HSGT, including corridor and station siting, throughout the State of Washington.

  Public/private partnerships should be encouraged in implementing HSGT even though private sector financing is likely to provide only a small share of initial capital costs.

- **HSGT development requires**

  Development of an awareness of and support for rail through public education and the successful demonstration of high-quality rail service

  Development of broad-based funding support

A COMMITMENT TO A HIGH-QUALITY INTERCITY RAIL SERVICE DOES NOT ELIMINATE THE NEED FOR CONTINUED INVESTMENT IN OTHER MODES

Improved urban transit systems are a must. Efficient connections to local bus and metro systems such as Portland's Max, Central Puget Sound's proposed Regional Transit Project (RTP) and Vancouver B.C's Skytrain are important to HSGT feasibility.

Continued upgrading of our urban freeways and major arterials is also critical. Highways are the major access to and from HSGT stations. Increased highway capacity and efficiency are important components of a balanced transportation system.

HSGT does not obviate the need for continued improvements and expansion of our airport system.

HSGT has the potential to reduce the demand for short-haul air commuter trips, but the greatest impacts are beyond the 2020 horizon of this Study. Further, HSGT will not have a significant impact on out of state air travel in the foreseeable future.

Despite extensive alignment improvements and new tunnels, a projected East-West HSGT route still is affected by the Cascade Range. Both the 300 mph and 185 mph maximum speed systems are slow crossing the mountains. Because of the one-hour thirty eight minute travel time for a 300 mph HSGT or the two-hour travel time for a 185 mph HSGT between Sea-Tat and the Moses Lake/Grant County Airport, there are serious concerns about the ability of a Moses Lake wayport to effectively serve out-of-state passenger travel to/from the Puget Sound region.

The implementation of a regional multiple airport system in the N-S Corridor could impact HSGT ridership and raises operational and ridership issues that warrant further study. The next phase of HSGT planning should examine the need to serve any supplemental airport to maximize the operational flexibility of the total air/HSGT system.

IV. RECOMMENDATIONS

- **Steps should be taken now to demonstrate the service potential of a high quality rail service with full integration with other urban transport modes and to develop further the support needed for statewide HSGT funding.**

- **The State of Washington, in concert with Oregon and British Columbia, should continue its commitment to upgrade Amtrak service and take further action <u>now</u> to build support for an HSGT program by adopting the following three goals.**

1. Implementation of true HSGT service (i.e., 150 mph or greater top speed) between Everett and Portland (Initial Segment) by the year 2020. This would be accomplished by meeting three specific milestones.

   Maximum travel time between downtown Portland and downtown Seattle of two hours and thirty minutes by the year 2000. This will require an average speed of 75 mph and a top speed of approximately 110 mph (presently travel time is three hours and fifty five minutes at an average speed of 47.5 mph). Such a system

   requires grade crossing elimination and/or the lifting of speed restrictions

   may require some new alignment and trackage to avoid low speed areas

   may require new or upgraded station and access facilities

   may require the partial separation of freight service.

NOTE: The capital costs noted on page 8 are for the full 590 mile HSGT system. The capital investment required to achieve the year 2000 milestone under Goal #1 is estimated at $1.2 to $1.5 billion.

   Maximum travel time (Portland-Seattle) of two hours by the year 2010; i.e., 2 x 2010 (“Two by Twenty-Ten”). This will require an average speed of 87 mph and a top speed of approximately 125 mph. Such a system may require electrification of the right-of-way

requires some sections of new alignment

may require the total separation of freight service.

True HSGT service between Everett and Portland by 2020 with a travel time (Portland - Seattle) of less than one hour and forty five minutes. Such a system

requires electrification of the right-of-way

requires total separation of freight service

requires additional new alignment (and right-of-way) to permit higher speeds where cost-effective

may require new station and parking/access facilities

2. Implementation of HSGT service between Everett and Vancouver, B.C. (possible in stages as recommended above for the Everett-Portland corridor) subject to refined alignment, ridership and institutional studies.

3. Implementation of HSGT service between King County and Spokane subject to refined alignment studies and resolution of key statewide policy issues related to economic diversity and regional airports.

All three Goals should be pursued concurrently. The required studies of the Everett-Vancouver, B.C. and King County-Spokane corridors should be undertaken in the next phase to establish specific implementation milestones for each.

V. A PHASED APPROACH TO IMPLEMENTATION

- **Initial Segment (Everett to Portland) planning and engineering should address**

  Maximum near term use of existing rail right-of-way and a priority plan for constructing new high speed segments

  Elimination of grade crossings to the maximum feasible extent, and the installation of modem grade crossing protection together with the lifting of local speed restrictions where grade crossings still exist

  The need to separate freight and passenger service through the development of integrated freight and passenger timetables

  The potential for non-electrified technology to provide a high quality first phase service

    X-2000 with diesel/electric or turbo train locomotives
    IC-3 self propelled
    Modem Amtrak equipment

  Ultimate electrification of the right-of-way between Portland and Everett

  Compatibility of any new right-of-way with future HSGT equipment

  Potential for private funding support (particularly for the Olympia-Seattle segment)

  The absolute need to offer passengers, through joint ticketing and scheduling efforts, a seamless trip from start to finish -- just as is available when using a private automobile

- **Initial segment planning and engineering deliverables should include**

  A comprehensive operations plan, including service schedules, to serve the various markets

  Coordination of intercity and commuter rail service between Olympia, Tacoma, Seattle and Everett

  Capital and O&M cost projections based on preliminary engineering

  Identification of funding sources and a financing plan which puts intercity rail on the same footing as comparable highway investments

  - Draft legislation, prepared in close coordination with Oregon & British Columbia, to create

    a public entity and/or empower an existing agency to carry out the project, and
    the revenue mechanisms necessary for HSGT implementation

  - Detailed route trade-off studies in key service areas, including

    Portland CBD/Portland airport
    01 ympia/Tacoma/Sea-Tac
    Seattle CBD (coordinated with RTP)/Everett

  - Detailed station location and station area development studies coordinated with county growth management efforts and local public transit agencies

  Refined ridership studies, including

    Further disaggregation of demographic data
    Peak period passenger traffic flows, coupled with route trade-off studies
    Potential market segments between Seattle and Olympia
    Additional data gathering for trips between Olympia and Portland

- **Long range studies should focus on**

  - Refinement of an overall system implementation plan to include

    - A specific decision making process to resolve financial and institutional issues

    - The development of an assured, statewide source of funds for HSGT capital programs

    - A vigorous statewide public information and feed-back process

    - Specific steps to preserve right-of-way for HSGT corridors

  - Development of specific plans for continuous upgrading of the Initial Segment beyond the year 2000 with a goal of true HSGT service (i.e., 150 mph or greater top speed) by 2020

    - Identification and prioritization of new HSGT alignment segments

    - Identification of new HSGT stations and intermodal facilities

  - Development of an implementation plan for HSGT service between Everett and Vancouver, B. C., including

    - Review of the impact of the North American Free Trade Agreement on the northwest regional economy and on HSGT ridership potential between the U.S. and B.C.

    - Refined ridership studies with particular focus on cross-border travel

    - The potential and time frame for upgrading existing tracks to achieve a staged implementation leading to true HSGT service.

    - Refined HSGT alignment and station location studies between Sea-Tat and Snohomish County

- Refined HSGT alignment and station location studies in Whatcom County

- Refined HSGT alignment and station location studies in the Lower Mainland of B.C.

- The proposed schedule for implementing HSGT service between Everett (Snohoxnish County) and Vancouver, B.C.

- Collaborative development with B.C. of the legal structure necessary to support HSGT

Development of an implementation plan for HSGT service between Seattle (King County) and Spokane, including

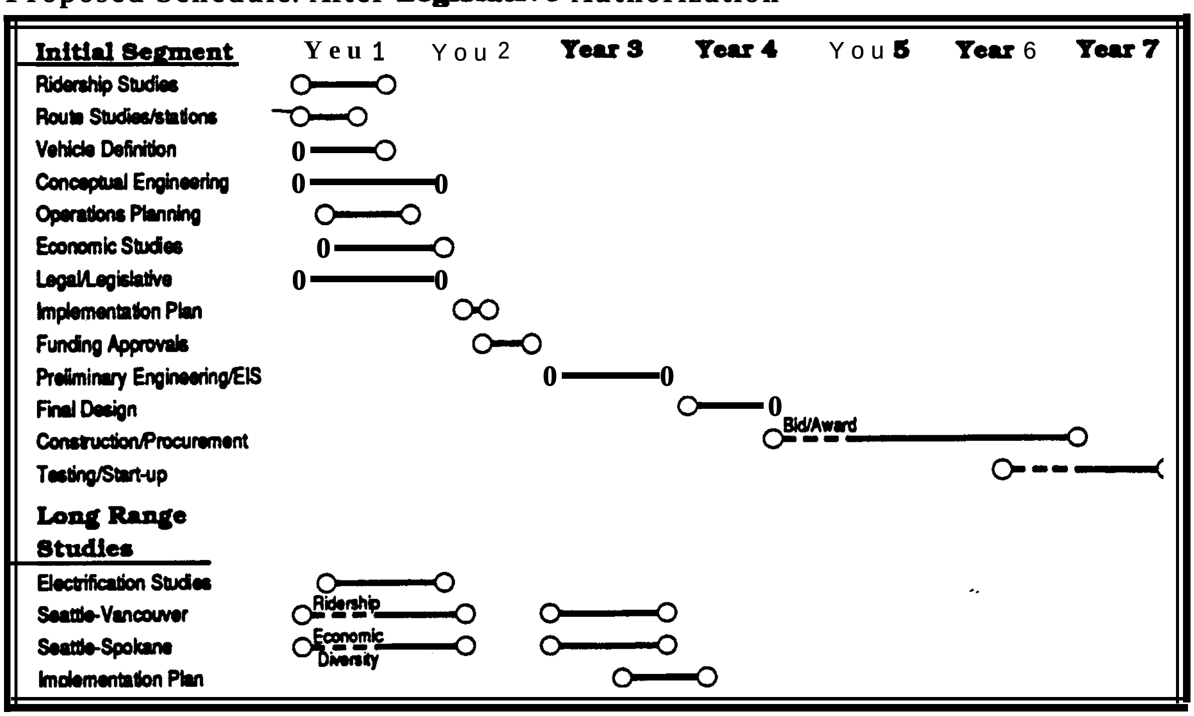
- Further review of the statewide benefits of economic diversity east of the Cascades

- Refined alignment and station location studies between Sea-Tat and Moses Lake with a station at Ellensburg

- Resolution of the location of a new regional airport to serve the Puget Sound area

- The proposed schedule for implementing HSGT service between King County and Spokane

Proposed Schedule: After Legislative Authorization



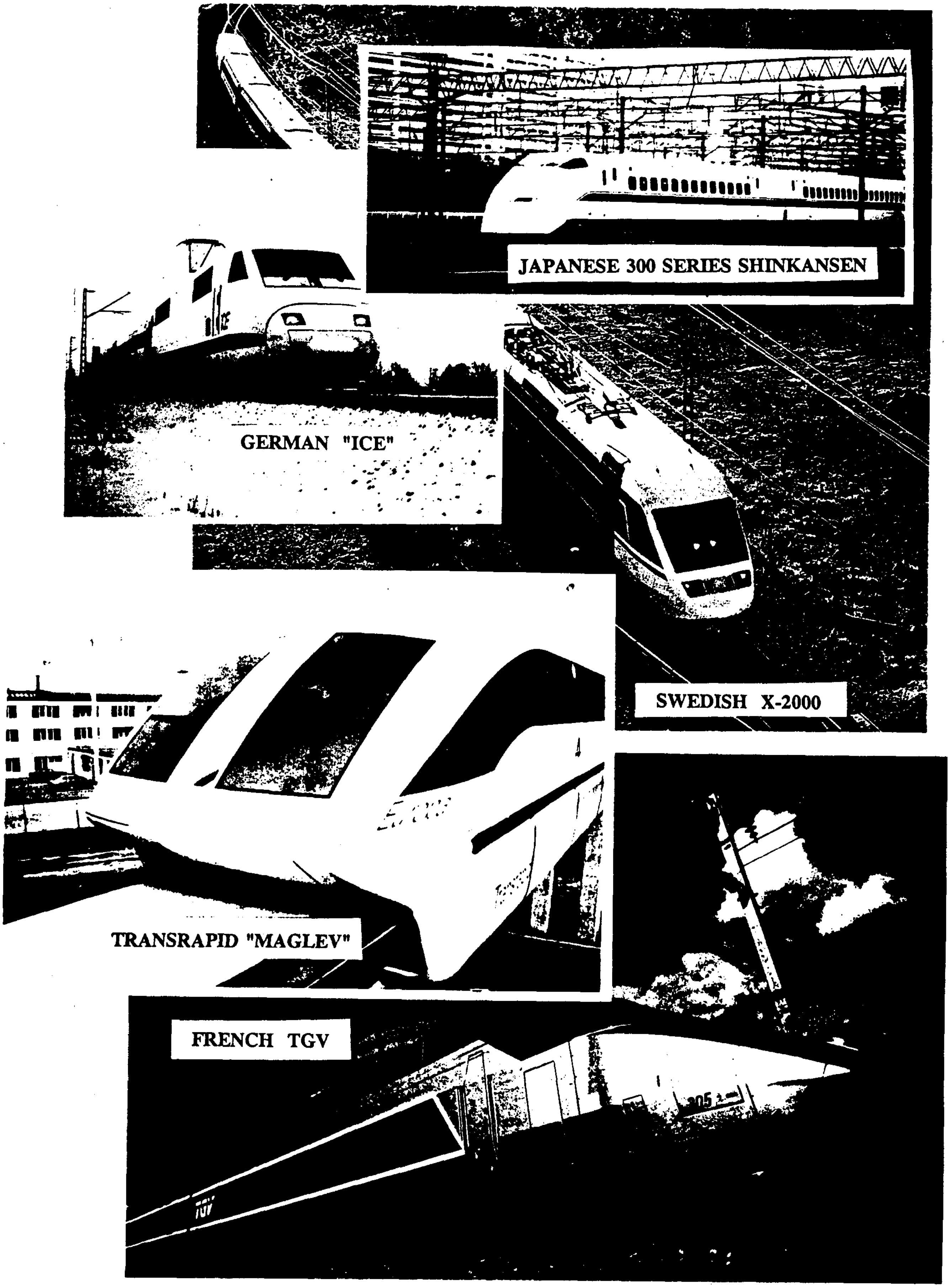
VI. SUMMARY OF THE TECHNICAL REPORT FINDINGS

An extensive Final Report with Appendices has been prepared. This Section summarizes the contents of that report.

- **HSGT Technologies**

The report evaluated all possible existing technologies either presently in operation, nearing implementation or in development, and selected five as representative for investigation in this study.

SUGGESTED TECHNOLOGIES	TYPE	SERVICE SPEED	MAXIMUM SPEED	# OF SEATS
x-2000 (Swedish)	Electric tilt train	125 mph	156 mph	256
Shinkansen (Japanese)	Conventional steel wheel on steel rail	162 mph	185 mph	varies
ICE (German)	Conventional steel wheel on steel rail	168 mph	219 mph	540
TGV (French)	Conventional steel wheel on steel rail	186 mph	320 mph	485
Transrapid 007 (German)	Attraction magnetic levitation	NA	272 mph	608



JAPANESE 300 SERIES SHINKANSEN

GERMAN "ICE"

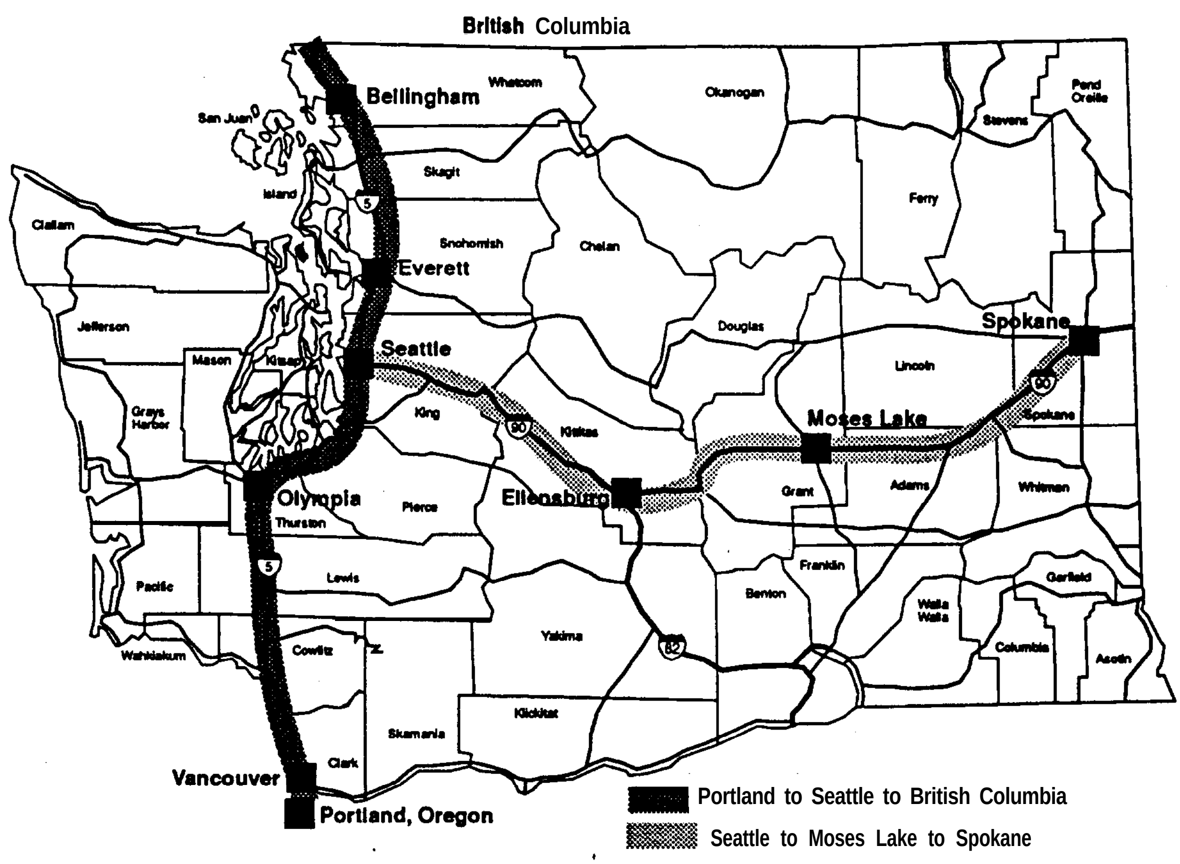
SWEDISH X-2000

TRANSRAPID "MAGLEV"

FRENCH TGV

- **Candidate Corridors**

The study applied criteria of corridor length, population, employment, current travel levels and other factors to select corridors for further analysis as possible corridors for high speed implementation. Two corridors were chosen for further evaluation: a North-South line from Vancouver, BC through Seattle, WA to Portland, OR, and a second East-West line from Seattle across and through the Cascades and Moses Lake to Spokane.



Washington State
Recommended HSGT Corridors for Further Study

- **Travel Demand and Ridership**

Existing and projected future population, employment and other data were gathered as well as 1992 travel data from both intercity auto and air passengers for inputs into a computer model. The model replicates current travel patterns and is used to predict future demand and ridership for a projected -high speed ground transportation system.

Over 8,000 highway intercept surveys were conducted in April and May of 1992 over three different days at one of three different survey points on both I-5 and I-90. In addition, a multi-day intercept survey was conducted that interviewed almost 1000 departing passengers on commuter-type flights out of Sea-Tat airport to any airport in Washington or to Portland, OR, or Vancouver, BC. Each auto and air passenger was also given a postage pre-paid longer survey aimed at determining their "stated preferences" for travel; Over 39 % of the auto and 30% of the air surveys were returned. The surveys were not intended to compute all trips, but rather the major intercity trips.

Data is available for both auto and air and for business and non-business travel in both the North-South and East-West corridors. The total estimated current annual travel volume, for the types of trips surveyed, in both the North-South and East-West corridors for auto is 58,702,500, for air is 728,500, for a total of 59,43 1,000 trips.

All data were used as input to a model that predicts future travel demand. The model predicted that by the year 2020 the total estimated annual travel volumes for both auto and air, and for both the N-S and E-W corridors would be 104,505,200, or a 76% increase in travel over the next twenty-eight years!

Using the base data, models, and forecasting assumptions, travel demand forecasts were prepared for a base case (without a high speed system) and for both a 185 mph. and a 300 mph. technology in both the N-S and the E-W corridors. This analysis shows that a HSGT system would experience the following travel demand in 2020.

- 185 mph. N-S - **5,121,500** annual trips
- 300 mph. N-S - **5,799,800** annual trips
- 185 mph. E-W - **2,264,400** annual trips
- 300 mph. E-W - **2,589,700** annual trips

These forecasts include both the diversion of existing and projected auto and air travelers to a HSGT system as well as new induced trips. These baseline projections are based on the conservative assumption that the level of congestion on the air and highway system does **not** change between now and the year 2020.

Additional forecasts were prepared to test the sensitivity of the forecasts to changes in the assumptions. These address scenarios such as increased congestion and energy costs, or changes in air travel time and changes in HSGT service characteristics. For example, a 20% increase in door-to-door auto travel time would result in a 17% increase in HSGT ridership. A 50% increase in auto operating costs would result in a 23% increase in HSGT ridership. It should be noted that these effects could be cumulative,

- **Acquiring the Right-of-Way**

Unit cost estimates were applied to the potential corridors to arrive at a range of costs for rights-of-way. The costs are included in the technical report in the cash flow analysis.

RIGHT-OF-WAY COSTS
(1992$)

	Low	High
North-South	**$599 M**	$715 M
East-West	$214 M	$254 M

- **Capital Costs**

The capital cost of the alternatives includes right-of-way, guideway, facilities, contingency, engineering, design, construction management, program **management** and vehicles. Four capital cost estimates were developed

CAPITAL COSTS
(1992$)

	Low	High
185 mph. N-S	**$9.028 B**	$11.950 B
185 mph. E-W	**$5.453 B**	**$7.314 B**
TOTAL	**$14.481** B	$19.264 B
300 mph. N-S	$12.130 B	$16.143 B
300 mph. E-W	$7.887 B	$10.350 B
TOTAL	$20.017 B	$26.493 B

As a comparison, the State Department of Transportation has estimated that to construct both I-5 and I-90 today would cost in excess of $21 B (1992 dollars).

Operating and Maintenance Costs

The estimates of operating and maintenance costs were derived by estimating the cost components and then applying them to a hypothetical operating plan. Again, four estimates were produced

0 & M COSTS

185 mph. N-S $156.5 M annually

300 mph. N-S $195.0 M annually

185 mph. E-W $105.8 M annually

300 mph. E-W $147.3 M annually

Environmental Impact

Minimizing adverse environmental impacts is a major objective and sensitive design will be required. However, the investigation found no environmental fatal flaws to the building of an HSGT system. The analysis looked at the critical areas of

Air quality
Noise
Electromagnetic Field Exposure
Wetland Resources
Rivers, Streams and Salmon Habitat
Geologically Hazardous Areas and Steep Slopes
Visual Aesthetics
Fish and Wildlife Conservation Areas
Prime Farmland
Forest Lands
Historical and’ Archaeological Resources
Wild and Scenic Rivers, and
Land Use

Economic Analysis

The study focused on the quantifiable economic benefits attributable to the provision of HSGT in the state. The analysis evaluated both corridors and at both speed ranges. The statewide 185 mph technology alternative generated the highest return in derivative benefits relative to the cost of system implementation. The following is a listing of the results of this analysis for this alternative

NORTH/SOUTH AND EAST/WEST
(1992$)

-net annual value of time benefits	$222,674,000
-total reduction in annual auto operating costs	$74,225,761
-annual value of reduced auto accidents	$15746,857
-average annual income impact of construction activity	$860,000,000
-total annual income impact from system operations	$310,000,000
-estimated annual energy cost savings (air and auto transfers to an HSGT system)	$17,440,000

The study also examined some less quantifiable economic and community issues including

Land Use and Land Values

Growth Management

Economic Diversity

Regional Transportation Plan Compatibility

Investment Avoidance

- **Financing the System**

The report prepared a Public Policy Cash Flow Analysis for the two corridors and the two speed ranges for the projected system. It provided the expected real financial requirements for the system alternatives over time. That data was used to calculate the state's capacity to fund those amounts and an analysis of the funding mechanisms to carry that out.

In the N-S corridor, the implementation of a 185 mph system would take 24 years and $11B. To implement the full N-S and E-W systems would take an additional 12 years and almost $7B more. The first operable segment of the N-S line would come into service between 5 and 7 years after the start of construction. Most importantly, a major finding of this part of the study was that each alternative presented would provide a net annual surplus from operations which could then be used to offset some of the costs of project development.

The 185 mph system begins to produce an operating surplus in year 12 of operations, however this surplus is not enough to pay for the entire cost of the system. Specifically, the system operating revenue would contribute 35.6% of total project costs, over the 60 year planning horizon.

For HSGT to be built in this state, there would have to be participation by the government in financing the capital construction of the selected system. Most importantly, the system could neither be built nor constructed exclusively using the existing state statutes.

For comparative purposes the study evaluated the capacity of existing revenue sources to finance such a system. As an example, a one-half cent sales tax statewide or a 20 cent gas tax statewide could provide the revenue to build the entire system.

- **Implementing and Managing the System**

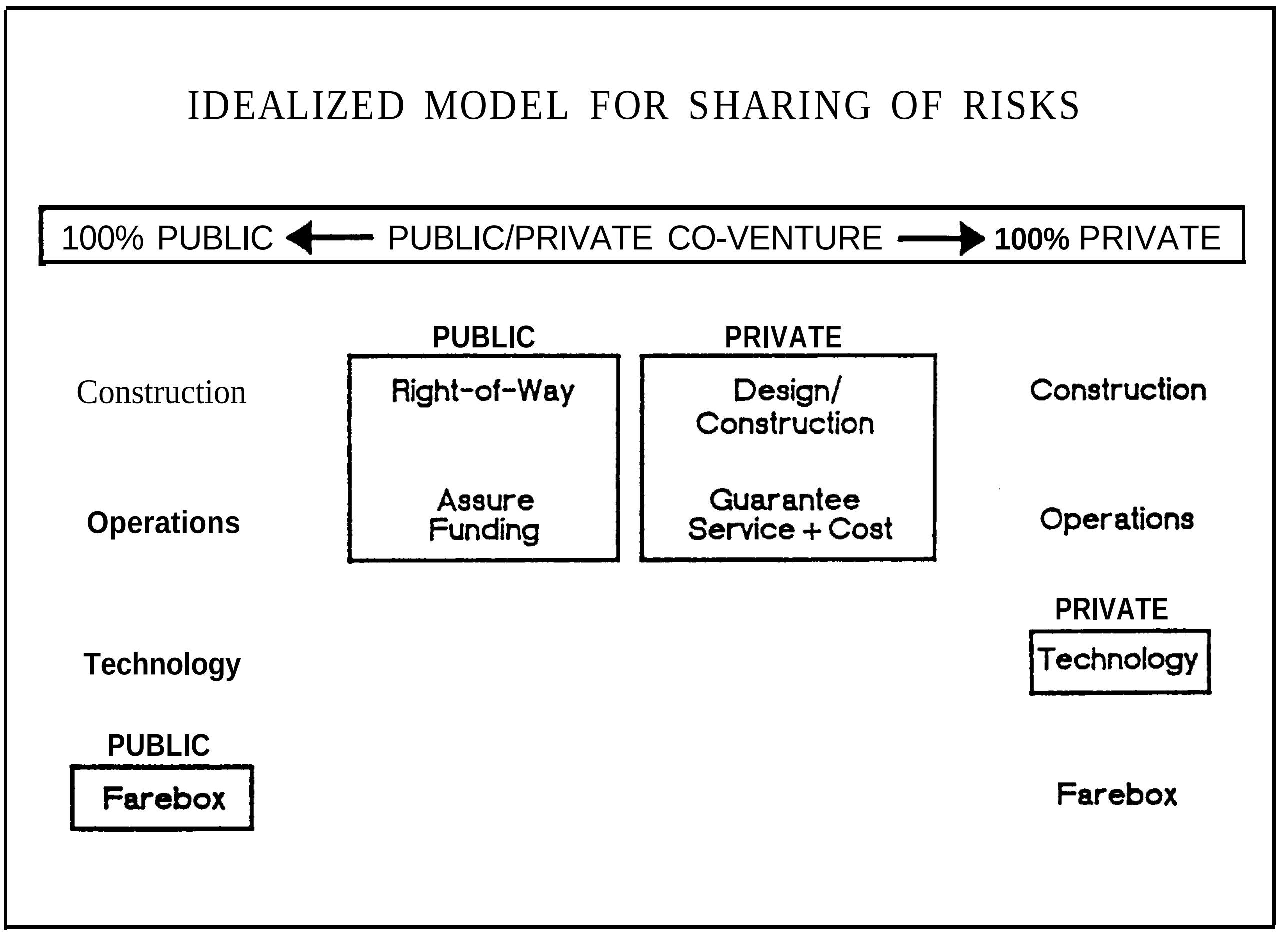
  - The key to public acceptance of HSGT in Washington is not the system's technology but rather its consistency with land use decisions as represented **in** local comprehensive plans for growth management and regional transportation.

    During the course of its deliberations, the Steering Committee considered institutional options for HSGT in France and Germany--where HSGT is in operation--and in other states attempting to implement HSGT--notably Florida, Texas, California and Nevada. The common thread in all instances is that the initiative has had public sector support as well as private backing.

INSTITUTIONAL STRUCTURES FOR
HIGH-SPEED GROUND TRANSPORTATION

Location	Structure	Status
Japan (Shinkanaen)	Mixed public and private owmrship	Operating
France **(TGV)**	**Integrated** into French national railway	Operating
Germany (ICE)	Integrated into **German** federal railway	Operating
Texaa	State authority to franchise private owner-operator	Development capital sought by franchisee
California-Nevada	Bi-rtate commission (non-profit corpomtion) to franchise private **owner-**operator	Franchisee could not find development **capital**
Florida (2 projects)	State to franchise private owner-opcmtor	Short-distance demonstration project **franchisee** may have development capital, statewide syatem **franchisee** could not **find** development capital
Pennsylvania (Pittsburgh only)	Public-private-labor consortium	Obtaining federal grant for design of demonstration project
Ohio	State authority has **contracted** with private **consortium** to devise a plan	Plans for public-private **effort** underway

The role of the public sector in a successful HSGT system must be to assume the risks government is best equipped for and leave to the private sector those risks for which it is best suited. Risks can be divided into four types: design/construction, operations, technology and farebox revenue. The private sector may be expected to guarantee firm costs for design/construction, operations (service) and technology (performance). The government might provide right-of-way for construction and take responsibility for farebox revenue, thereby assuring funding for operations. This shared responsibility is shown in the following diagram; the boxed areas identify the suggested allocation of risk.



The most effective form of management for an HSGT system in the Pacific Northwest would be a partnership among the States of Washington and Oregon and the Province of British Columbia. To bring about this governing structure, compatible legislation must be enacted by the two states, the province, and the U.S. and Canadian governments to address common issues.

SPECIFIC ISSUES OF GOVERNANCE FOR WASHINGTON STATE INCLUDE THE FOLLOWING

- designation and empowerment of a statewide agency to lead the next steps toward implementation of HSGT
- coordination with Growth Management Act processes and deadlines
- clarification of decision-making authority between the state and the counties
- relationship of HSGT to the Air Transportation Commission (AIRTRAC) and integration of AIRTRAC plans with HSGT plans
- requirements for coordination of surface transportation to integrate with and feed HSGT
- enacting or enabling statewide financing mechanisms
- potential liability of a private operator for liability claims resulting from accidents on the HSGT system